

CLAIMS

What is claimed is:

- 1 1. A method of manufacturing a semiconductor device comprising the steps of:
 - 2 a) providing an organic semiconductor layer;
 - 3 b) depositing a reactive species on a portion of the organic semiconductor layer; and
 - 4 c) reacting the reactive species with the portion of the organic layer to form a
 - 5 dielectric layer.
- 1 2. The method of claim 1 wherein reacting comprises one of oxidizing, reducing or
- 2 isomerizing.
- 1 3. The method of claim 1 wherein the dielectric layer is a gate dielectric layer.
- 1 4. The method of claim 3 wherein step a) further comprises the steps of a1) providing a
- 2 gate electrode and a2) providing the reactive species on the gate electrode.
- 1 5. The method of claim 1 wherein the reactive species comprises one of a liquid, a solid,
- 2 or a suspension.
- 1 6. The method of claim 1 wherein the dielectric layer comprises an insulating layer of a
- 2 thin film transistor.
- 1 7. The method of claim 1 wherein the semiconductor device is part of a circuit for
- 2 addressing an electronic display.
- 1 8. A method of manufacturing a semiconductor device comprising the steps of:
 - 2 a) providing an organic semiconductor layer; and
 - 3 b) exposing a surface of the organic semiconductor layer to a radiation to form a
 - 4 dielectric layer.
- 1 9. The method of claim 9 wherein the radiation is electron beam or electromagnetic
- 2 radiation.
- 1 10. The method of claim 10 wherein the radiation is ultraviolet electromagnetic radiation.
- 1 11. A method of manufacturing a transistor comprising the steps of:

- 2 a) providing an organic semiconductor layer adjacent a gate electrode;
- 3 b) providing an electrochemical cell wherein the gate electrode is an electrode of the
- 4 electrochemical cell; and
- 5 c) applying a voltage to the gate electrode to cause an electrochemical reaction to
- 6 form a gate dielectric between the gate electrode and the organic semiconductor layer.

1 12. A method of protecting organic layers in an electronic device, comprising the steps
2 of:

- 3 a) providing a first organic layer;
- 4 b) providing a barrier layer adjacent to the first organic layer, wherein the barrier
- 5 layer is resistant to a solvent; and
- 6 c) providing a solution or a dispersion comprising the solvent and a layer-forming
- 7 material adjacent to the first organic layer.

1 13. The method of claim 13 wherein the first organic layer comprises one of a polymeric
2 substrate, a semiconductor, a dielectric, and a conductor.

1 14. The method of claim 13 wherein the solution or the dispersion comprises an ink and
2 further comprising the step of:
3 d) forming from the ink a second layer comprising a semiconductor, a conductor, or a
4 dielectric.

1 15. The method of claim 13 wherein the solution or the dispersion comprises an ink and
2 further comprising the step of:

3 d) forming from the ink a second layer comprising a semiconductor, wherein the
4 semiconductor has a preferred domain structure due to the influence of the dielectric
5 layer on the formation of the semiconductor layer.

1 16. The method of claim 16 wherein the preferred domain structure comprises one or
2 more of large domains, domains with a preferred orientation, and domains with a
3 preferred direction.

1 17. The method of claim 13 wherein step (c) is a patterning step.

- 1 18. The method of claim 13 wherein the barrier layer comprises one of silicon nitride,
2 silica, alumina, poly(meth)acrylates, polyurethanes or polyvinyl alcohol.
- 1 19. The method of claim 13 wherein the barrier layer comprises one of an insulator, a
2 semiconductor, or a conductor.
- 1 20. The method of claim 13 wherein a thickness of the barrier layer is about one tenth a
2 thickness of the first organic layer.
- 1 21. The method of claim 13 wherein a thickness of the barrier layer is in the range of
2 10nm to 50nm.
- 1 22. The method of claim 13 wherein step (b) further comprises depositing the barrier
2 layer by one or more from a set comprising chemical vapor deposition, ion-milling,
3 sputtering, gas-phase deposition, spin-coating, and printing.

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